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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/875,197	06/07/2001	Joon-Young Yang	8733.132.20	8761

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EXAMINER

RAO, SHRINIVAS H

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 11/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/875,197

Applicant(s)

YANG, JOON-YOUNG

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-34,39 and 40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 21-34,39 and 40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Response to Amendment

Applicants' amendment filed on August 20, 2002 has been entered on August 29, 2002.

Therefore claims 21-34 and 39-40 as recited in the in the amendment of December 12, 2001 as currently pending in the application.

Double Patenting

It is noted that the previous double patenting rejection was based on invention drawn to identical subject matter.

Applicants' contention that claims 1 and 10 of the 6,281,055 patent includes limitations like the thickness limitations of the gate insulation layer and of the active layer and to the implant energy limitations are not persuasive because claims 28 and 29 of the instant application also include these limitations.

Applicants' other contention, that claim 21 of the instant application includes the steps of gate metal layer formation and the gate insulation layer formation. Claim 1 of the 6,281,055 patent recites, "forming a gate insulating layer" and "forming a gate on the gate insulating layer" similar to instant claim 21.

The double patenting rejection is maintained for reasons previously stated and those stated above and made FINAL.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 31 and 32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 31 and 32 both recite, " the hydrogen ions heat the temporarily excited region to a temperature between about 200-300 degrees Celsius."

Applicants' allege that direct support for the above recitation is found on page 6 lines 1-26 and more specifically lines 7-26 .

Applicants' specification page 6 lines 7-26 state:

" The optimal temperature for impurity doping according to the preferred embodiment is a temperature in the range of 200-300 degrees Celsius. In the preferred embodiment , as the active region 35 increases, the time necessary for hydrogen ion implantation correspondingly increases in order to achieve the temperature range between about 200 to 300 degrees Celsius. Therefore, the size of the active region or layer is proportionately related to the hydrogen implantation time required to achieve an optimal temperature.

Similarly, if the implantation energy of the hydrogen ion implantation increases, the active layer 35 heats up more rapidly.

As the implanted ions collide with the exposed surface of the active layer 35, the kinetic energy of the hydrogen ions yields thermal energy. Subsequently, the exposed surface of the active layer 35 collided with the implanted hydrogen ions yields is heated to the optimal temperature range falling between about 200-300 degrees Celsius, thereby forming an excited region 41, as illustrated in fig. 2B. As the size of the

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hydrogen particle is significantly small, the excited region is not damaged by the collision with implanted hydrogen particles. " (emphasis supplied) .

Therefore from the above it is clear that is the active layer 35 collided with the implanted hydrogen ions is heated to the optimal temperature range falling between 200-300 degrees Celsius . and it is not the hydrogen ions heat the temporarily excited region to a temperature between about 200-300 degrees Celsius as presently recited.

Therefore it is not clear how applicants' can state, " A discussion of using implanted hydrogen ions to heat regions, optimally to the 200-300 degrees temperature range, is provided in a manner that would be understood by those skilled in the art ".

Applicants' above statement is not persuasive for the reasons stated above and the previous 112 (2) rejection is maintained and made Final.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

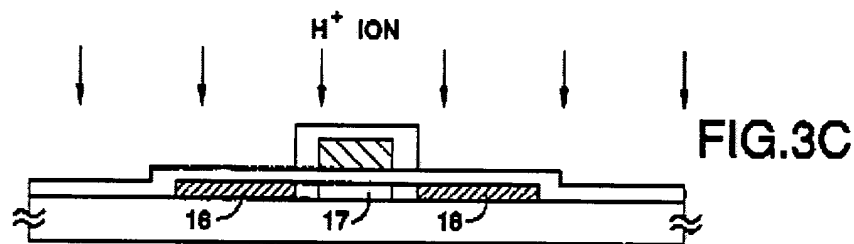
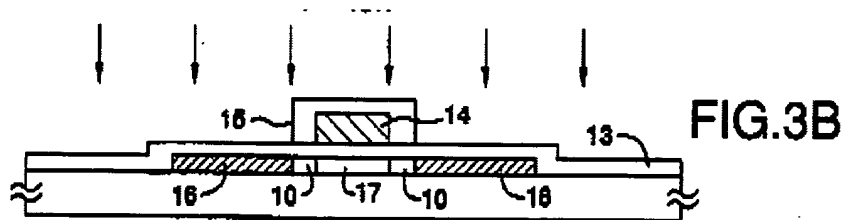
Claims 21-34 and 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al. (U.S Patent No. 5,897,346 herein after Yamaguchi, also cited by the applicants' in their IDS) for reasons previously stated and incorporate here by reference for the sake of brevity and those stated below.

With respect to claims 21 and 39 Applicants' contend that Yamaguchi does not disclose the recited steps of , " forming a gate and temporarily exciting a region of

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active layer by implanting hydrogen ions in to the exposed portion of the active layer while using the gate as a mask.

Yamaguchi figs. 3 b and c (reproduced below) :



It is noted that 11 is the substrate (active semiconductor layer) , 14 is the gate electrode (col. 10 lines 24-25) formed on the active layer and as seen hydrogen is implanted in to the exposed portion (region of 11 not covered by 14 or region 18 not covered by 14) of the active layer while using the gate as a mask. It is noted that Applicants' and Yamaguchi perform the same steps for the same purposes and what is true for applicants' (i.e. the H implantation temporarily exciting a region) is also true for the reference).

Applicants' other contention that Yamaguchi does not provide a motivation to perform H-ion implantation without a gate insulating layer, let alone when using the gate as a mask is also not persuasive.

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It is noted that Applicants' all embodiments seen from the illustration in Figs. 2 b and C shows only implantation of H ions through gate oxide 37 and applicants' presently recited claims includes the step of forming an insulating layer and then implantation of the H ions.

The use of a gate mask while implantation of H is shown in the figure reproduced above.

Applicants' next contend that Yamaguchi does not teach or even suggest the recited step of : "forming an impurity region by (heavily – it is noted that the word heavily is not in that claims and therefore not given any patentable weight) implanting ions into the temporarily excited region while that region is excited."

When the above recitation is read in light of Applicants' specification page 6 lines 7-26 etc.

"..Similarly, if the implantation energy of the hydrogen ion implantation increases, the active layer 35 heats up more rapidly.

As the implanted ions collide with the exposed surface of the active layer 35, the kinetic energy of the hydrogen ions yields thermal energy. Subsequently, the exposed surface of the active layer 35 collided with the implanted hydrogen ions yields is heated to the optimal temperature range falling between about 200-300 degrees Celsius, thereby forming an excited region 41, as illustrated in fig. 2B. As the size of the hydrogen particle is significantly small, the excited region is not damaged by the collision with implanted hydrogen particles... "

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Therefore as seen at least from fig. 3c reproduced above the implantation of H ions will form an impurity region and as implanted ions collide with the exposed surface of the active layer 35, the kinetic energy of the hydrogen ions yields thermal energy (all naturally occurring phenomenon and also true for the reference Yamaguchi) and subsequent heating (Yamaguchi col. 10 lines 37- about 300 degrees) will cause implanting ions into the temporarily excited region while that region is excited.

Therefore all the presently recited features of claim 21 and 39.

Claims 22-34 and 40 were alleged to be allowable because they depend upon independent allegedly allowable claims 21 and 39.

However, as shown above claims 21 and 39 are not allowable. Therefore claims 22-34 and 40 are also not allowable and are rejected for reasons previously stated (and incorporated here by reference) and those stated herein above.

Response to Arguments

Applicant's arguments filed 8/29/02 have been fully considered but they are not persuasive. for reasons set out at length above and briefly repeated here .

As shown above Yamaguchi describes or suggests, " forming a gate and temporarily exciting a region of active layer by implanting hydrogen ions in to the exposed portion of the active layer while using the gate as a mask,

Yamaguchi provides a motivation to perform H-ion implantation without a gate insulating layer, let alone when using the gate as a mask.

Yamaguchi teaches or suggests the recited step of : " forming an impurity region by (heavily – it is noted that the word heavily is not in that claims and therefore not given

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any patentable weight) implanting ions into the temporarily excited region while that region is excited.

It is noted that as the same reference as previously applied is also applied here this forms a separate basis of making this action Final.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on 8.00 to 5.00.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 7463926 for regular communications and (703) 872-9319 for After Final communications.

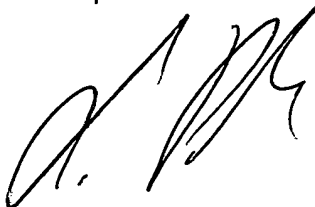
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 3067722.



Steven H. Rao

Patent Examiner

October 31, 2002



LONG PHAM
PRIMARY EXAMINER